

## Chapter 1 Study Guide

1. Identify the parts of the scientific method in the paragraph above and interpret the data to formulate a conclusion.

A student investigated whether ants dig more tunnels in the light or in the dark. She thought that ants used the filtered light that penetrated the upper layers of earth and would dig more tunnels during the daytime. Ten ant colonies were set up in commercial ant farms with the same number and type of ants per ant farm. The same amount of food was given to each colony, and the colonies were in the same temperature. Five of the colonies were exposed to normal room light and five were covered with black construction paper so they did not receive light. Every other day for one week the length of the tunnels was measured in millimeter using a string and a ruler. Averages for the light and dark groups for each measured were then computed. The averages are listed in the following chart.

Length of Tunnels (mm) Constructed by Ants in Different Light Conditions

Day	Light	Dark
1	5	7
3	10	15
5	20	25
7	26	32

Observation: Ants dig tunnels (So simple its tricky☺)

Hypothesis: If there is sunlight, <sup>then</sup> ants will dig more tunnels than they do in the dark.

Experiment: 5 colonies were exposed to normal light and 5 colonies were exposed to no light. Every other day for 1 week the tunnels were measured in millimeters.

Conclusion: Ants dig longer tunnels in the dark.

2. What is the difference between a theory and a law? What do they have in common?

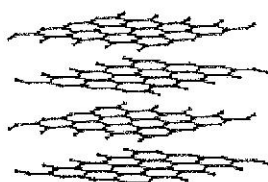
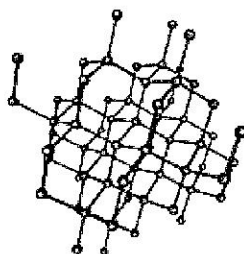
Theories explain why something happens, laws merely state what happens. Both are formulated after many experiments have been performed.

3. Examine two allotropes (same chemical composition, different structure) of carbon and answer the questions that follow:

Diamond



Graphite (replaced lead in pencils)



- a. Name two physical properties of diamonds.

reflect light, hard, solid etc.

- b. Name one physical property of graphite.

dark grey, slippery, solid.

- c. Based on the definition of chemistry and the pictures to the left, how is it possible that two substances made of the same element can have different properties?

They have different structures.

4. Two astronauts recorded weight s on earth are the same.

- a. One astronaut goes on a mission to the moon. How does the weight of the astronaut on the moon compare to the one on earth? *It is less than the weight of the astronaut on earth.*
- b. How do their masses compare?

*Their masses are the same. Gravity does not affect mass.*

5. Identify 3 qualitative and 3 quantitative properties in the following advertisement.

FOR SALE: A brand new 4-wheel drive Prius Hybrid. Gets great gas mileage, 34 miles per gallon. Includes black leather seats, air conditioning, and seats 5 passengers. Very environmentally friendly!

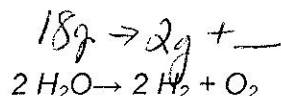
Qualitative	Quantitative
<i>new</i>	<i>4-wheel drive</i>
<i>great (gas mileage)</i>	<i>34 miles/gallon</i>
<i>black seats.</i>	<i>5 passengers</i>

6. Write the process you would use to separate a mixture of sugar, water, alcohol an marbles using crystallization, filtration and distillation (not necessarily in that order) and the properties listed below.

Substance	Solubility in Water	Degrees Celsius
Sugar	Dissolves	186
Alcohol	Dissolves	78
Water		100

Step	Process	Removed	Remains
1	<i>Filtration</i>	<i>Marbles</i>	<i>Sugar, water, alcohol</i>
2	<i>distillation</i>	<i>alcohol</i>	<i>sugar, water</i>
3	<i>crystallization</i>	<i>Water</i>	<i>Sugar</i>

7. Using the definition of the law of conservation of mass and the equation below, solve the following problem.



If 2.0g of hydrogen are produced when 18.0g of water decomposes, how much oxygen is produced?

*16g*

8. Identify the following as either a physical change or chemical change.

- a. Recycling old aluminum cans to make new ones. Physical
- b. Photosynthesis Chemical  $C_6H_{12}O_6 + 6O_2 \rightarrow 6CO_2 + 6H_2O$
- c. Grating cheese Physical
- d. Burning gasoline Chemical
- e. Dying cloth Physical

9. A spoonful of sugar with a mass of 8.8 grams is poured into a graduated cylinder. The volume reading is 5.5 mL. What is the density of the sugar?

$$D = \frac{m}{V} \quad \frac{8.8g}{5.5mL} = 1.6 g/mL$$